

Objective Deepening Understanding of Volume

Warm-Up



Determine the division of each problem.

1. 10.3×6

Sample worked out



$$\begin{array}{r}
 1 \\
 10.3 \\
 \times \quad 6 \\
 \hline
 61.8
 \end{array}$$

← There is **1** decimal

← There is **0** decimal

← Total of **1** decimal place to put back

2. 15.2×5

3. 20.2×3

4. 30.3×4



You have calculated the volume of a rectangular prism using the formula $V = lwh$, where V is the volume, l is the length, w is the width, and h is the height. You also know that the area of a rectangle can be calculated using the formula $A = l \cdot w$.

Consider the two formulas:

$$V = l \cdot w \cdot h$$
$$A = l \cdot w$$

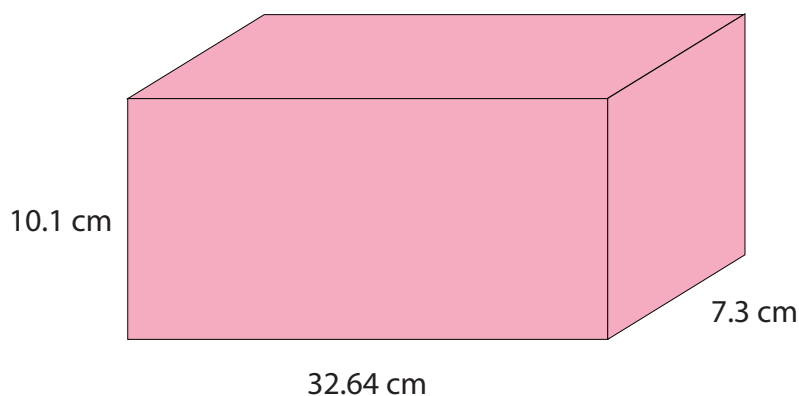
If B is used to represent the area of the base of a rectangular prism, then you can rewrite the formula for area: $B = l \cdot w$.

Now consider the two formulas:

$$V = l \cdot w \cdot h$$
$$B = l \cdot w$$

Using both of these formulas, you can rewrite the formula for the volume of a rectangular prism as $V = B \cdot h$, where V represents the volume, B represents the area of the base, and h represents the height. In order to calculate the volume of various geometric solids you will need to perform multiplication. In this activity, you will calculate the volume of rectangular prisms with decimal side lengths.

Consider the right rectangular prism shown



To calculate the volume of the prism, first calculate the area of the base, B, by multiplying 32.64 meters by 7.3 meters.

Kenny said, "I use estimation to help place the decimal point correctly in the product."

WORKED EXAMPLE

The area of the base is 32.64 meters \times 7.3 meters.
He estimates his two numbers.

$$\begin{array}{l} 32.64 \text{ is close to } 30 \\ 7.3 \text{ is close to } 7 \\ 30 \times 7 = 210 \end{array}$$

So he knows his product is close to 210, but larger since he rounded down. Next, he calculates the product of

$$\begin{array}{r} 32.64 \\ \times 7.3 \\ \hline 9792 \\ 228480 \\ \hline 238.272 \end{array}$$

Kenny knows the product will be close to but greater than 210, so he must place the decimal point after the 8. The area of the base of the rectangular prism is 238.272 square meters.

So we now multiply by 10.1 to get the volume of the

$$\begin{array}{r} 238.272 \\ \times 10.1 \\ \hline 238272 \\ 000000 \\ \hline 23827200 \\ 24065472 \end{array}$$

2406.5472 cubic centimeters solution

2. Each number sentence represents the base, B , times height, h , of different rectangular prisms. Complete each number sentence by inserting a decimal point to show the correct volume.

a. $53.6 \text{ sq. ft} \times 0.83 \text{ ft} = 44488 \text{ cu. ft}$

b. $7.9 \text{ sq. cm} \times 0.6 \text{ cm} = 474 \text{ cu. cm}$

c. $0.94 \text{ sq. m} \times 24.9 \text{ m} = 23406 \text{ cu. m}$

3. Casey thought that using a pattern would help her understand how to calculate the product in a decimal multiplication problem.

a. Copy and complete the table.

Problem	Product	Problem	Product	Problem	Product
32×100		32×100		0.32×100	
32×10		3.2×10		0.32×10	
32×1		3.2×1		0.32×1	
32×0.1		3.2×0.1		0.32×0.1	
32×0.01		3.2×0.01		0.32×0.01	
32×0.001		3.2×0.001		0.32×0.001	

4. A rectangular prism with $B = 26$ square centimeters and $h = 31$ centimeters has a volume of 806 cubic centimeters. Use this information to determine the volume of the other rectangular prisms.

a. $2.6 \text{ sq. cm} \times 31 \text{ cm}$

b. $2.6 \text{ sq. cm} \times 3.1 \text{ cm}$

c. $0.26 \text{ sq. cm} \times 3.1 \text{ cm}$

d. $2.6 \text{ sq. cm} \times 0.31 \text{ cm}$

e. $0.26 \text{ sq. cm} \times 31 \text{ cm}$

f. $2.6 \text{ sq. cm} \times 0.031 \text{ cm}$

g. $0.026 \text{ sq. cm} \times 0.31 \text{ cm}$

h. $0.26 \text{ sq. cm} \times 0.31 \text{ cm}$

5. Look at the patterns in Question 4.

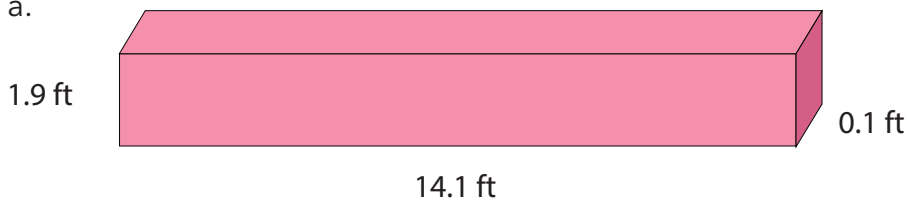
a. How can some of the rectangular prisms have the same volume?

b. How can you tell without multiplying which rectangular prisms will have the same volume?

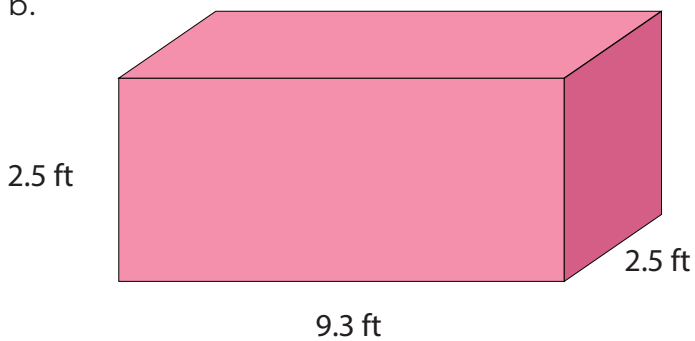
b. The athletic director wants to store cube boxes that are $\frac{1}{2}$ foot wide. How many boxes will the storage closet hold?

4. Estimate the volume of each right rectangular prism. Then calculate its volume.

a.



b.





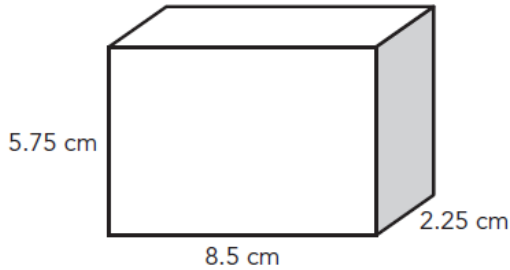
LESSON 3.1b Length, Width, and Depth



Objective Deepening Understanding of Volume

Practice

1. Consider the right rectangular prism shown.



- List the numbers of faces, edges, and vertices of the rectangular prism.
 - Estimate the volume of the rectangular prism.
 - Calculate the volume of the rectangular prism.
2. Calculate the volume of the rectangular prism with each set of given dimensions.
- 7 in. \times 4 in. \times 2 in.
 - 5.2 cm \times 5.2 cm \times 12 cm
 - 11.3 cm \times 3.5 cm \times 10.1 cm
 - 4.5 m \times 9 m \times 6.7 m
 - 2.2 ft \times 5.5 ft \times 15 ft